

# Description

## Small Arms Weapon Bipod

### FEDERAL RESEARCH STATEMENT

[0001] The inventions described herein may be manufactured, used and licensed by or for the U.S. Government for U.S. Government purposes.

### BACKGROUND OF INVENTION

[0002] When firing small weapons, especially automatic weapons, from a bipod on hard surfaces such as macadam, concrete or ice, the weapon typically becomes unstable and it is hard to control the point of impact of the projectile. This is a problem which is inherent with all known bipods.

[0003] In the prior art, rubber pads have been provided on the bottom feet of a bipod. Such soft rubber pads do provide some improved holding on hard surfaces. However, rubber pads wear away with use, and rubber pads are not effective on ice.

[0004] Also in the prior art, saw tooth configurations have been provided on the bottom of the bipod feet. Such saw tooth

configurations work well on ice, but offer no advantage on hard surfaces. In addition, the saw tooth configured feet of the prior art are always exposed, creating physical hazards to the user and adjacent people when handling (especially carrying) the weapon. Further, when chemical and biological protective suits are required for the gunner, the risk of degrading and or damaging the protective gear with the exposed sharp teeth of the saw tooth configured feet is a major concern.

#### **SUMMARY OF INVENTION**

[0005] In accordance with the present invention, a bipod for a weapon is provided having a base which is attached to the weapon and a pair of legs which extend in a use position from the base downwards and outwards away from one another relative to a longitudinal axis of the weapon. Each leg includes an inner member having a pointed distal end and a proximal end which is attached to the base, and an outer member which freely slides relative to the inner member. The outer member includes a foot at a distal end thereof having an aperture therein through which the pointed distal end of the inner member extends when the outer member is in an retracted position and hence the pointed distal end is in an exposed position. Each leg also

includes a holding mechanism which holds the outer member relative to the inner member such that the pointed distal end is located within the outer member adjacent the aperture of the foot when the outer member is in an extended position and hence the pointed distal end is in a withdrawn (protected) position.

[0006] In a preferred embodiment, the base includes a mounting rail located between the legs. In addition, the base also includes an upper portion, a lower portion, and a means for securing the upper portion and the lower portion together about a receiver of the weapon. Further, each the foot is wider than an adjacent portion of the outer member and two adjacent upturned edges. The pointed distal end is most preferably made of hardened steel.

[0007] In the preferred embodiment, the holding mechanism allows free movement of the outer member relative to the inner member as the outer member moves from the retracted position to the extended position. Thus, the pointed distal end is easily changed between the exposed position and the withdrawn position simply by pulling on the outer member. Preferably, the holding mechanism is automatically engaged as the outer member is moved from the retracted position to the extended position and

hence the pointed distal end is changed from the exposed position to the withdrawn position. This is conveniently accomplished wherein the holding mechanism includes a spring loaded latch extending from an inside surface of the outer member of each the leg.

[0008] Also in the preferred embodiment, the base includes a mounting means for mounting each leg thereto for pivoted movement to a position parallel and adjacent to the longitudinal axis of the weapon. In addition, the mounting means mounts each leg for movement either forwards and rearwards from the use position.

[0009] It is an advantage of the present invention that automatic weapons can be fired from a bipod on hard surfaces, such as macadam, concrete or ice, with stability and control.

[0010] It is also an advantage of the present invention that the pointed end is retracted during non-use periods so that the pointed end is not a danger to the user or to others.

[0011] It is a further advantage of the present invention that the pointed end is moved to the use/extended position only by a positive movement of the user.

[0012] It is yet another advantage of the present invention that the bipod is fixed to the receiver of the weapon in a manner which does not interfere with access to an accessory

rail of the weapon.

[0013] It is still another advantage of the present invention that the bipod legs fold forward and out of the way during non-use, so that if the pointed distal end is not in the withdrawn position it also points away from the user.

[0014] It is still another advantage of the present invention that the bipod can be easily taken apart and cleaned.

[0015] Other features and advantages of the present invention are stated in or apparent from detailed descriptions of presently preferred embodiments of the invention found hereinbelow.

#### **BRIEF DESCRIPTION OF DRAWINGS**

[0016] Figure 1 is a front elevation view of a bipod system in accordance with the present invention.

[0017] Figure 2 is a top elevational view of the bipod system of figure 1 with a part of the securing means removed and the legs in a stowed position.

[0018] Figure 3 is a right side elevation view of the bipod system of figure 1.

[0019] Figure 4 is a cross-sectional view of the holding mechanism of figure 1 where the outer member is in the retracted position.

[0020] Figure 5 is a bottom and front perspective view of a foot

of the bipod system of figure 1.

[0021] Figure 6 is a cross sectional side view of an inner member of the present invention.

[0022] Figures 7 and 8 are schematic side views of portions of a flange with a locking member respectively at a locked position and an unlocked position.

#### **DETAILED DESCRIPTION**

[0023] With reference now to the drawings in which like numerals represent like elements throughout the views, a bipod 10 in accordance with the present invention is depicted in figure 1 in an extended or use position and in figure 2 in a folded or stored position. Bipod 10 includes a base 12 which is attached by a securing means 14 to a suitable receiver (not shown) of the weapon having an axis A which is generally parallel to the barrel of the weapon. Preferably, the receiver is a reduced collar portion of the gas chamber of an automatic weapon, but some other suitable element can instead or alternately be provided on the weapon as necessary or desired.

[0024] Securing means 14 is provided by forming base 12 of an upper portion 16 and a lower portion 18 which fit together to define therebetween a hole 20 through which the reduced collar portion of the receiver is rotatably re-

ceived. Securing means 14 allows the weapon to be rotated relative to bipod 10 in order to keep the sights of the weapon vertically oriented and hence not canted when the surface that bipod 10 rests on is not (as is typical) horizontal. Of course, the reduced collar portion keeps securing means 14 from moving along the reduced collar portion (horizontally along axis A) even while rotation is allowed. During non-use of the weapon when it is anticipated that bipod 10 will be in a stored position for some time, a pin 26 is removably received in upper part 16 so that a portion of pin 26 extending through hole 20 is also received in a matching groove provided in an upper part of the reduced collar portion. Thus, when pin 26 is in place during non-use of the weapon, base 12 of bipod 10 is oriented in a position directly beneath the gas chamber and bipod 10 does not rotate (is made immovable) relative to the collar portion.

[0025] Upper portion 16 is attached to lower portion 18 with bolts 22 which pass through bores in upper portion 16 and which are threadably received in threaded bores 24 in lower portion 18 as shown. Thus, securing means 14 is used to removably secure base 12 to the receiver at the position of the reduced collar by tightening of bolts 22.

While hole 20 has been depicted as circular, it will be appreciated that other shapes may be used as desired and required, so long as the securing to the receiver is suitably effected. For example, hole 20 could instead be polygonal shaped (especially octagonal), to provide discrete multiple surfaces which engage a round receiver. In addition, depending on which direction the receiver extends through hole 20, the folded position can extend away (preferred) or towards a stock of the weapon.

[0026] Attached to base 12 is a pair of legs 30a and 30b which form the two vertical supports of bipod 10. Legs 30a and 30b extend in the use position shown in figure 1 downwards and outwards from base 12 and away from one another relative to the longitudinal axis A of the weapon. Each leg 30a and 30b is a mirror image of the other, so only the associated elements of leg 30a will be described in detail, and for convenience such elements will use the "a" after the number even where a corresponding element of the other leg 30b is not identified.

[0027] As shown, leg 30a includes an inner member 32a having a pointed distal end 34a and a proximal end 36a which is attached to base 12. At least pointed distal end 36a of inner member 32a is made of a hardened steel or the like,



or covered with a hard coating to achieve a similarly hard outside surface resistant to wear and dulling of the point thereof. Preferably, as shown in figure 6, inner member 32a includes a tube 33a to which a discrete pointed distal end 34a is attached by use of a spring pin 35a removably passing through tube 33a and an adjacent reduced portion of pointed distal end 34a closely received in tube 33a. It will be noted that tube 33a includes a longitudinal slot 37a therein, whose purpose will be explained subsequently.

[0028] The attachment of proximal end 36a to base 12 is made by a mounting means 38a by which leg 30a is pivotally mounted relative to lower portion 18a (and hence pivotally displaceable towards and away from weapon axis A). In particular, mounting means 38a includes a flange 40a which is integral with lower portion. Flange 40a has a pivoting surface 41a oriented at an angle  $\Theta$  with respect to axis A, which in this preferred embodiment is about 6°. Pivotaly attached to flange 40a is head 42a having a main surface 44a and small side surfaces 46a which freely ride along pivoting surface 41a. As shown in figure 6, proximal end 36a of inner member 32a is attached to head 42a by use of a dowel 43a received in a close fitting manner

inside both proximal end 36a and an adjacent bore in head 42a. Dowel 43a is held in position by use of a removable spring pin 45a which passes through tube 33a and dowel 43a.

[0029] Pivotal holding head 42a to flange 40a is a hold-down member 48a. Hold-down member 48a is used hold head 42a in place while allow pivoting of head 42a between the use position of leg 30a as depicted in figure 1 and the storage position as depicted in figure 2. As shown best in figure 6, a locking means 49a is used to lock leg 30a in either the use or storage position. Locking means 49a includes a spring mounted pin 50a having a detent 51a and a reduced mid-section 52a. Detent 51a is positioned to be biased by a spring 55a into either of notches 53a or 54a provided in the adjacent perimeter of flange 40a as shown in figures 7 and 8, with notches 53a and 54a corresponding to the use and storage positions of leg 30a. It will be appreciated that when pin 50a is moved against the force of spring 55a to release detent 51a from the associated notch 53a or 54a (as by a temporary pushing on pin 50a or by a forceful jerk on leg 30a in the desired pivoting direction), the adjacent end of detent 51a and reduced mid-section 52a are positioned to ride freely along the adja-

cent perimeter of flange 40a until detent 51a is again spring biased into one of notches 53a or 54a. Thus, locking means 49a makes it easy to pivot leg 30a by pulling on leg 30a between the forward folded position as depicted in figure 2 or the use position shown in figure 1).

[0030] Mounted for free sliding movement on inner member 32a is an outer member 60a which is conveniently made of lightweight aluminum for easier movement, while the remainder of bipod 10 is made of a durable steel. Outer member 60a only slides freely on inner member 32a within the limits determined the ends of slot 37a of tube 33a as a set screw 61a is threadably received in outer member 60a extends into slot 37a. Outer member 60a includes a foot 62a at the distal end thereof having an aperture 64a (shown in figure 1 where a portion of foot 62a has been broken away) through which pointed distal end 34a of inner member 32a extends when outer member 60a is in a retracted position as shown in figure 1 so that pointed distal end 34a is in an exposed position. Foot 62a extends about outer member 60a in a plane which is parallel to the ground when bipod 10 is in a use position, and foot 62a also includes two adjacent upturned edges 66a and 68a at the associated extremities thereof. In order to

hold outer member 60a relative to inner member 32a, a holding mechanism 70a is provided. Holding mechanism 70a is used to maintain pointed distal end 34a within outer member 60a and adjacent aperture 64a when outer member 60a is in an extended (away from base 12) position so that pointed distal end 34a is thus in a withdrawn position where pointed end 34a cannot accidentally engage anything or anyone.

[0031] Preferably, holding mechanism 70a allows free movement of outer member 60a relative to inner member 32a as outer member 60a is moved from the retracted position to the extended position simply by pulling on outer member 60a. In this manner, outer member 60a is easily and quickly movable to the extended position, especially as leg 30a is also moved by the user from the use position to the storage position. To accomplish this, holding mechanism 70a includes a first notch 72 provided on the outer surface of inner member 32a as shown in figure 4. Located adjacent notch 72, but displaced upwards relatively thereto in the non-engaged position of figure 4, is a detent 74 which is resiliently biased by a spring 76 towards a position where detent 74 will engage notch 72. Detent 74 is integral with a button 78a (as by forming essentially

a rectangular latch) located on the opposite side of inner member 32a from notch 72. It will thus be appreciated that spring 76, detent 74 and button 78a are located in a housing 80a of outer member 60a with button 78a extending slightly from housing 80a in order to be depressed by a user and thereby to release detent 74 from notch 72 when desired. Located below notch 72 is one or more second notches 82 (only one of which is shown).

[0032] In operation as associated with pointed distal end 34a, holding mechanism 70a functions in the following manner. When detent 74a is located in notch 72a, outer member 60a is held in the extended position where pointed distal end 34a is withdrawn inside of foot 62a. In this extended position, pointed distal end can not injure anything or anyone, and as outer member 60a is securely held in place, pointed distal end will not move from this withdrawn position except by purposeful action of the user. While outer member 60a is in this extended position, leg 30a may be in either the stored position of figure 2 (or even oppositely directed along the receiver axis A if desired by reversal of the front-back orientation of securing means 14), or in the use position of figure 1 where foot 62a engages the ground. When it is desired to use

pointed distal end 34a to engage a hard surface or otherwise be exposed, button 78a is depressed by the user (after bringing leg 30a down, or as leg 30a is brought down from the stored position of figure 2 if needed) as the user also pushes up on outer member 60a to move outer member 60a from the extended position (hiding pointed distal end 34a) to the retracted position (exposing pointed distal end 34a). Alternatively, with foot 62a (and foot 62b) resting on the ground and supporting the weight of the weapon, button 78a can be depressed to release outer member 60a from the extended position so that the weight of the weapon will move outer member up towards the retracted position sufficiently enough to expose pointed distal end 34a for engagement with the ground.

[0033] Once it is no longer desired to have pointed distal end 34a exposed, the user simply pulls downward (or outward from weapon axis A) on outer member 60a until detent 74 automatically engages notch 72, due to the resilient force of spring 76. This movement thus locks outer member 60a in the extended position until button 78a is again depressed by the user. It will be noted that the pulling on outer member 60a may be simply and somewhat naturally

(or unavoidably) accomplished as leg 30a is moved from the use to the stored position, facilitating the desired positioning of pointed distal end 34a in the withdrawn position quickly and easily.

[0034] It will be appreciated that if it is desired to have outer member 60a extend beyond the extended position described, to provide bipod 10 with a greater height, that button 78a can also be depressed and outer member 60a pulled downward until detent 74 engages second notch 82; or if a plurality of notches 82 are provided (where notches 82 are provided, of course, within the limits of movement determined by set screw 61a in slot 37a), to the desired notch 82. Subsequently, if it is thereafter desired to have pointed distal end 34a in the exposed position, button 78 must be depressed until detent 74 passes by first notch 72.

[0035] In this preferred embodiment, base 12 is also provided with a standard (MIL-STD-1913) accessory mounting rail 90 beneath lower portion 18 for convenience, which rail 90 will be additional to any standard accessory mounting rail provided on the weapon itself and which it will be noted is not interfered with by bipod 10.

[0036] While various preferred embodiments of the invention

have been described above, other equivalent mechanical operators can be employed. For example, a number of different holding mechanisms, including a spring biased pin such as pin 50a, could be used. Similarly, various mounting means besides mounting means 38a could be used to move leg 30a from a locked use position to a locked storage position. Further, while inner member 32a and outer member 60a have been depicted and described as being tubes, these members could also be angle, flat, or otherwise shaped as desired.

[0037] Thus, while the present invention has been described with respect to exemplary embodiments thereof, it will be understood by those of ordinary skill in the art that other variations and modifications can be effected within the scope and spirit of the invention.